In recent years there have been many efforts to understand strongly correlated systems by applying the AdS/CFT correspondence. In this regards, one may try to build models which can explain the process of momentum relaxation (dissipation). In this talk I will focus on two simple types of these models called the polynomial and square root models. These models are constructed by adding some static massless scalar fields (which linearly depend on the spatial coordinates of the boundary theory) to the gravity theory of Einstein-Maxwell. Applying the AdS/CFT correspondence, theses scalar fields are dual to marginal deformations to the dual CFT.

In this talk I will first introduce these two models. Next, I will review some non-local quantities such as entanglement entropy, mutual information, and Wilson loop and the holographic method used in their calculations. Then, I will report our results for theses non-local quantities in the two aforementioned holographic models. We show that the marginal deformations introduce new universal terms in entanglement entropy for entangling regions in the shape of strip, sphere and cylinder. Interestingly, it can be shown that in 4d CFT's the a-charge and c-charge are decreased along the RG-flow. On the other hand, momentum dissipation seems to reduce the correlation length in the dual field theory. This argument is based on the observations that the holographic mutual information and the confinement/deconfinement phase transitions happen at smaller critical lengths, and the fact that the force between a pair of point like objects is decreased as a result of the marginal deformations. Moreover, I will briefly review the extension of theses models to hyperscaling violating models, and our results on holographic entanglement entropy, which shows momentum dissipation can not correct the Fermi surface in the dual field theory, if it already exists.

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